**Chemical Casualty Management & Diagnostics**
**FY03-05 Research Program Plan Objective (PPO) Summary**

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**1. Objective(s):**

The ultimate objective of the chemical casualty management research program is to most effectively diagnose, determine a prognosis for, and manage the joint service warfighter exposed to chemical warfare agents. This objective involves developing effective, field-deployable diagnostic equipment; decontamination products; pharmaceutical treatments; and practical clinical strategies to aid in the clinical management of chemical warfare agent casualties. The approach focuses on 1) meeting the warfighter's needs, 2) minimizing additional burden by the proposed product, 3) minimizing cost, and 4) expediting fielding.

To meet the warfighter's needs, the product must have a high probability of use. That is, for individually issued items, the warfighter must consider it a personal priority to bring the item on deployment and to use in a battlefield scenario, for the product to be effective. If the warfighter considers the product not worth the effort to carry or too complicated to use, the product will be worthless. For medical devices and analytical equipment, the operators and logistical support must consider it a priority to transport to the field. The product must have universal application, such that a decontamination product will decontaminate all threat chemical warfare agents, present and future. The product must be compatible with fielded technology, replace current technology, or afford a different clinical strategy of treatment. The product must be user-friendly for minimized training requirements and quick usefulness.

The research focuses on the "Best Buy" philosophy. For pharmaceutical treatments, investigators should place priority on the list of Food and Drug Administration (FDA) approved drugs to minimize FDA approval costs and expedite fielding. For novel drugs, the ease of mass production and overall production costs should be evaluated early. For analytical monitors, investigators should first evaluate off-the-shelf products to minimize research development costs and expedite product fielding. If that option is not available, they should develop cooperative agreements with companies that minimize Government costs, where the company has a vested interest to produce a device for the civilian community as well. Product development solely for military uses should be investigated as a last resort.

**2. Strategic Plan for Achieving Objectives:**

- Develop methods to analyze physiological matrices (blood, urine, skin, etc.) to detect the presence of CW agents or their breakdown products. Develop screening methods that focus on field portability and rapid analysis. Develop confirmation methods that focus on accuracy and sensitivity to detect low CW doses in warfighters who show little to no effects or large acute levels from samples taken long after the exposure. Focus on sulfur mustard, lewisite, nerve agents, cyanide, and phosgene.

- Identify prognostic indicators, such as cholinesterase activity, to aid chemical casualty disposition and treatment.

- Develop and evaluate improved procedures for chemical casualty decontamination, focusing on effectiveness and speed, such as mass decontamination shower procedures.

- Identify products that have potential for rapid fielding and that effectively treat CW agent injuries and conventional wounds contaminated by CW agents.

- Investigate the mechanism of tissue damage and healing of CW agent injuries and conventional wounds contaminated by CW agents.

- Develop and validate animal models and screening methods to formulate clinical procedures for the management of CW agent injuries and conventional wounds contaminated by CW agents.

- Identify improved clinical strategies for optimal treatment of CW agent injuries and conventional wounds contaminated by CW agents such as skin grafting for sulfur mustard wounds.

**3. FY03-05 Goals:**

- Modify the currently fielded cholinesterase testing kit to more efficiently test a large sample load.

- Evaluate several wetting solutions for the polyurethane sponge as a decontaminant against nerve and vesicant agents.

- Evaluate new FDA approved drugs for treatment of mustard induced ocular injury.

- Identify the essential ingredients for a rinse solution to optimally treat mustard induced ocular injury.

- Conduct studies directed at obtaining FDA approval for an ocular rinse that optimally treats mustard induced injuries.

- Continue to evaluate commercially available shelf wound healing products and identify the top five products to treat sulfur mustard induced injuries.

- Develop and test a prototype instrument that measures methemoglobin non-invasively from the finger, ear and toes.

- Develop a hand held nanodevice to detect chemical warfare agents by using synthetic molding and molecular imprinting of the agents in question.

- Develop an acetylcholinesterase testing device that allows instantaneous individual monitoring of warfighter.